IN THE SPECIFICATION

Please replace the paragraph beginning at page 1, line 12, with the following rewritten paragraph:

In a producing apparatus of a semiconductor, for example, a chemical treatment such as etching is carried out in a vacuum chamber. At this time, a vacuum pump is used for reducing pressure in the vacuum chamber and a pressure regulating valve is used for controlling the vacuum pump. FIG. 17 shows a known vacuum pressure regulating valve. This valve includes a first main port 1 and a second main port 2 connected to a vacuum pump and a vacuum chamber, a valve seat 4 formed around a port hole 3 of the first main port 1, a disc-shaped valve member 5 having an annular sealing member 6 for opening and closing the valve seat 4 on a front face of the member 5, and an air cylinder mechanism 7 for causing the valve member 5 to carry out opening and closing operations.

Please replace the paragraph beginning at page 1, line 23, with the following rewritten paragraph:

A regulating shaft portion 5a in ~~a~~ the shape of a cylindrical column is formed inside the annular sealing member 6 on the front face of the valve member 5 and a regulating hole portion 3a of such a size that the regulating shaft portion 5a can be fitted in the portion 3a with a clearance between them is formed at an end portion of the port hole 3. A ~~kind of~~ throttle-like member is formed by fitting of the regulating shaft portion 5a in the regulating hole portion 3a when the valve member 5 opens and closes the valve seat 4 and the valve seat 4 is gradually opened and closed by the action of the throttle to thereby enhance controllability of a flow rate at a stage of a small opening degree of the valve member 5.

Please replace the paragraph beginning at page 2, line 5, with the following rewritten paragraph:

However, the structure in which the regulating shaft portion 5a in the shape of the cylindrical column is formed on the front face of the valve member 5 and is fitted in the regulating hole portion 3a formed at the end portion of the port hole 3 complicates ~~a~~ the shape of the valve member 5, increases ~~a~~ the weight of the valve member 5, and impairs workability and operability. Moreover, ~~it~~ such also affects ~~a~~ the flow rate characteristic when the valve member 5 fully opens the valve seat 4. In other words, ~~a~~ the shape of the opening when the valve member 5 is fully open approximates ~~to~~ a cylinder formed ~~of~~ with an outside diameter D4 of the regulating shaft portion 5a, an inside diameter D5 of the regulating hole portion 3a, and a distance X from an end of the valve seat 4 or the regulating hole portion 3a to the regulating shaft portion 5a. Because both the regulating shaft portion 5a and the regulating hole portion 3a have smaller diameters than a seat diameter D6, ~~an~~ the opening area of a flow path is subject to constraints by the regulating shaft portion 5a and the regulating hole portion 3a.

Please replace the paragraph beginning at page 3, line 11, with the following rewritten paragraph:

In the pressure regulating valve of the invention having the above structure, the valve member is driven by the driving mechanism and the first sealing member is brought in contact with and separated from the valve seat to thereby open and close the valve seat. Here, when the valve member closes the valve seat from an open state, the flow path area first changes by a large amount. When the valve member approaches the valve seat and is fitted in the flow path wall, the flow path is throttled by the outer peripheral wall of the valve member and the flow path wall and the restricted flow path is formed of a clearance between

the outer peripheral wall and the flow path wall. The flow path area of the restricted flow path is gradually ~~reduces~~ reduced as the outer peripheral wall is fitted in the flow path wall and the first sealing member finally comes in contact with the valve seat to close the valve seat.

Please replace the paragraph beginning at page 4, line 3, with the following rewritten paragraph:

As a result, the pressure regulating valve of the invention has excellent controllability at a stage of a small opening degree of the valve seat by the valve member because the restricted flow path is formed by the flow path wall formed around the valve seat and the outer peripheral wall of the valve member and the flow path area of the restricted flow path can gradually be changed. ~~A~~ The shape of an opening when the valve member is fully open approximates a cylinder formed of an outside diameter of the outer peripheral wall, an inside diameter of the flow path wall, and a distance from an upper end of the flow path wall to the valve member. Because both the outside diameter of the outer peripheral wall and inside diameter of the flow path wall are greater than the seat diameter of the valve seat, the flow path area in terms of valve opening does not suffer constraints by the valve member and the flow path wall and ~~a~~ the flow rate characteristic in the valve opening is excellent. Moreover, because there is no need to form a prior-art regulating shaft portion on the front face of the valve member, the valve member can be formed ~~in~~ with a simple and lightweight shape and the workability and operability thereof are excellent.

Please replace the paragraph beginning at page 4, line 19, with the following rewritten paragraph:

In the invention, ~~a~~ the height of the flow path wall and ~~a~~ height of the outer peripheral wall of the valve member preferably approximate ~~to~~ each other. At least one of the outer peripheral wall of the valve member and the flow path wall may be tapered.

Please replace the paragraph beginning at page 4, line 26, with the following rewritten paragraph:

In the invention, a plurality of notches for regulating the flow path area of the restricted flow path is preferably provided ~~to~~ on one of the outer peripheral wall of the valve member and the flow path wall. The notches may be grooves provided ~~to~~ on the outer peripheral wall of the valve member or the flow path wall in a longitudinal direction of the wall or may be holes formed in a cylindrical member forming the flow path wall.

Please replace the paragraph beginning at page 5, line 5, with the following rewritten paragraph:

According to a preferred structural aspect of the invention, one of the outer peripheral ~~wall~~ walls of the valve member and the flow path wall not provided with the notches is provided with a second sealing member for coming in contact with the other wall to thereby control the flow path area of the restricted flow path together with the notches.

Please insert the following paragraph at page 5, between lines 19 and 20 as follows:

A more complete appreciation of the present invention and many of the attendant advantages thereof will be readily obtained as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings, wherein:

Please replace the paragraph beginning at page 7, line 5, with the following rewritten paragraph:

The valve opening/closing portion 10 has a housing 13 made of metallic material such as stainless steel (SUS) and is in ~~a~~ the shape of a cylindrical column or a square pole. The housing 13 has a first main port 14 to be connected to one of the vacuum chamber and a vacuum pump, a second main port 15 to be connected to the other, a connecting path 16 connecting both the main ports 14 and 15, and an annular valve seat 17 provided in the connecting path 16. The first main port 14 is formed in a coaxial position with an axis L of the housing 13 and the second main port 15 is formed in an orientation at 90° from the first main port 14.

Please replace the paragraph beginning at page 7, line 5, with the following rewritten paragraph:

The valve seat 17 is formed ~~in~~ at a position on an inner end side of a port hole 14a of the first main port 14 so as to surround the port hole 14a and a circular flow path wall 18 surrounding the valve seat 17 is formed integrally with the housing 13 around the valve seat 17. This flow path wall 18 is provided coaxially with the valve seat 17 and rises to a certain height in a direction of the axis L and a height H of the flow path wall 18 approximates to a thickness T of the disc-shaped valve member 20. The flow path wall 18 is inclined by being tapered so that a diameter of the flow path wall 18 increases upward. As a result, the diameter D2 of the flow path wall 18 is smaller on a lower end portion side near the valve seat 17 and is larger on an upper end portion side near the connecting path 16. Moreover, the smallest diameter of the flow path wall 18 on its lower end portion side is still greater than a seat diameter D1 of the valve seat 17.

Please replace the paragraph beginning at page 7, line 26, with the following rewritten paragraph:

Inside the housing 13, the poppet-type valve member 20 for opening and closing the valve seat 17 is provided coaxially with the valve seat 17 in the connecting path 16. This valve member 20 is in a disc shape and has a substantially flat front face 20a and a circular outer peripheral wall 21 and an annular rubber first sealing member 22 for coming in contact with and separating from the valve seat 17 is mounted in a position close to an outer peripheral edge of the front face 20a. The front face 20a is not provided with a portion or a member projecting further forward than the first sealing member 22 from the front face 20a, i.e., a projecting portion or a projecting member which would be fitted in the port hole 14a inside the valve seat 17 to affect change in a flow path area. ~~A~~ The diameter D3 of the outer peripheral wall 21 is uniform throughout a total length of the outer peripheral wall 21, i.e., a total thickness of the valve member 20 and is slightly smaller than the diameter of the lower end side of the inclined flow path wall 18.

Please replace the paragraph beginning at page 8, line 13, with the following rewritten paragraph:

In the example shown in the drawings, the valve member 20 has ~~the~~ a substantially uniform thickness which is substantially equal to a height of the outer peripheral wall 21 and therefore the height of the outer peripheral wall 21 approximates to the height H of the flow path wall 18. However, the thickness of the valve member 20 is not necessarily uniform but the valve member 20 may partially project on a back face side. The height of the outer peripheral wall 21 may be slightly smaller or larger than the height H of the flow path wall 18.

Please replace the paragraph beginning at page 9, line 12, with the following rewritten paragraph:

A cylindrical stopper 27 for determining a fully open position of the valve member 20 is fixed around ~~to~~ rod 26. The stopper 27 extends a certain distance from the back face of the valve member 20 along the rod 26 and an end portion of the stopper 27 comes in contact with a contact portion 36a of the partition 36 in the fully open position of the valve member 20. A spring seat 28 is provided to the back face of the valve member 20 and a coil-shaped return spring 29 for elastically pushing the valve member 20 in a closing direction is provided between the spring seat 28 and the partition 36. A bellows 30 for expanding and contracting is provided to the back face of the valve member 20 so as to surround the rod 26, the stopper 27, and the return spring 29. One end of the bellows 30 is mounted to the back face of the valve member 20, the other end is mounted to a support plate 31 provided between an end portion of the housing 13 and the partition 36, and the bellows 30 expands and contracts as the valve member 20 opens and closes.

Please replace the paragraph beginning at page 11, line 17, with the following rewritten paragraph:

Thus, the regulating valve has excellent controllability of a flow rate at the stage of the small opening degree of the valve seat 17, e.g., at the initial stage of valve opening or immediately before valve closing ends, because the restricted flow path is formed by the flow path wall 18 around the valve seat 17 and the outer peripheral wall 21 of the valve member 20 and the flow path area of the restricted flow path gradually changes when the opening degree of the valve seat 17 by the valve member 20 is small. ~~A~~ The shape of the opening portion when the valve member 20 is in the fully open position approximates ~~to~~ a cylinder formed of the diameter D3 of the outer peripheral wall 21, the diameter D2 of the flow path

wall 18, and a distance X from an upper end of the flow path wall 18 to the valve member 20. However, because both the diameters D3 and D2 are greater than the seat diameter D1 of the valve seat 17, the flow path area in valve opening does not suffer constraints by the valve member 20 and the flow path wall 18 and the flow rate characteristic in valve opening is excellent. Moreover, because there is ~~not~~ no need to form the prior-art regulating shaft portion on the front face 20a of the valve member 20, the valve member 20 can be formed ~~in~~ with a simple and lightweight shape and the workability and operability thereof are excellent.

Please replace the paragraph beginning at page 12, line 20, with the following rewritten paragraph:

Structures ~~of~~ for the valve of the second embodiment other than those described above are substantially similar to those of the first embodiment. This holds true for the third and the following embodiments which will be described below.

Please replace the paragraph beginning at page 12, line 24, with the following rewritten paragraph:

FIGS. 4 and 5 show essential portions of the third embodiment of the invention. In a valve of the third embodiment, both the outer peripheral wall 21 of the valve member 20 and the flow path wall 18 are tapered in the same direction, a plurality of notches 45 for regulating a flow path area and forming a portion of a restricted flow path formed between both the walls 18 and 21 are provided ~~to~~ on the outer peripheral wall 21, and a second sealing member 46 for coming in contact with the outer peripheral wall 21 is mounted in a recessed groove 47 formed in the flow path wall 18 which is not provided with such notches 45.

Please replace the paragraph beginning at page 13, line 6, with the following rewritten paragraph:

Each ~~the~~ notch 45 is formed ~~of~~ with a groove extending in an axial direction of the valve member 20 and may be in a V shape as shown in FIG. 8, a shape having a flat bottom as shown in FIG. 9, a chamfered shape obtained by linearly cutting a portion of a circumference as shown in FIG. 10, or other shapes. The plurality of notches 45 is formed at regular intervals along the circumference of the outer peripheral wall 21 as shown in FIG. 11. In this case, all of the plurality of notches 45 may ~~be in~~ have the same shapes or ~~the~~ notches ~~in~~ with different shapes may be mixed.

Please replace the paragraph beginning at page 13, line 14, with the following rewritten paragraph:

Each ~~the~~ notch 45 is formed not throughout a length of the outer peripheral wall 21 from the axial front end 21a to the rear end 21b but is instead formed locally in a portion from the front end 21a to some midpoint of the outer peripheral wall 21. Moreover, ~~a~~ the depth of the notch 45 is greater on the front end 21a side of the outer peripheral wall 21 and gradually reduces toward the rear end 21b side.

Please replace the paragraph beginning at page 13, line 20, with the following rewritten paragraph:

In the third embodiment, if the valve member 20 approaches the valve seat 17 and is fitted in the flow path wall 18, the restricted flow path is formed of the clearance 23 between the outer peripheral wall 21 of the valve member 20 and the flow path wall 18. Then, if the valve member 20 further moves and ~~a~~ the degree of fitting of the valve member 20 with the flow path wall 18 increases, the valve member 20 comes in contact with the second sealing

member 46 as shown in FIG. 4 and, as a result, the clearance 23 is closed and the restricted flow path is now formed ~~of~~ by the plurality of notches 45 only and is further throttled. If the valve member 20 further moves in this state, the area of the restricted flow path further reduces because the depth of each the notch 45 is gradually reducing. In a position in FIG. 5 where the first sealing member 22 comes in contact with the valve seat 17, the valve is closed.

Please replace the paragraph beginning at page 14, line 16, with the following rewritten paragraph:

Each ~~the~~ notch 45 may be formed throughout the outer peripheral wall 21 or the flow path wall 18 from the front end side to the rear end side. In this case, the notch 45 may have a uniform depth or a gradually changing depth.

Please replace the paragraph beginning at page 15, line 13, with the following rewritten paragraph:

FIG. 14 shows an essential portion of the sixth embodiment of the invention. The sixth embodiment is different from the above-noted fourth and fifth embodiments in that the hole forming each the notch 45 is not ~~in~~ of a circular shape but ~~in~~ of a shape of a narrow and elongated hole which is long in the axial direction of the flow path wall 18. In this case, all the holes 45 may have the same lengths or long elongated holes 45 and short elongated holes 45 may be provided alternately as shown in the drawing.

Please replace the paragraph beginning at page 15, line 23, with the following rewritten paragraph:

FIG. 15 shows an essential portion of the seventh embodiment of the invention. The seventh embodiment is different from the above fourth to sixth embodiments in that the cylindrical member 18a forming the flow path wall 18 is tapered and inclined with its diameter increasing upward and that the second sealing member 46 is mounted to the outer peripheral wall 21 of the valve member 20. In this case, the notches 45 formed ~~in~~ on the cylindrical member 18a may be circular holes or elongated holes. If the circular holes are provided, two holes may be provided to each the position to be formed with holes as shown in FIG. 12 or two holes and one hole may be provided alternately in the positions to be formed with (a) hole(s) as show in FIG. 13. If the elongated holes are provided, the elongated holes having the same lengths may be provided in the respective positions to be formed with the hole or the long elongated holes and short elongated holes may be provided alternately as shown in FIG. 14.